In the Specification:

Amend various locations as follows:

Page 1, lines 3-9

~~RELATED U.S. APPLICATIONS~~ CROSS-REFERENCE

This ~~is a~~ application is a Continuation-In-Part of application Serial No. 10/058, 868, filed January 28, 2002 **(now U.S. Pat. No. 6,675931, issued January 13, 2004)**, which is a Continuation-In-Part application Serial No. 09/542,155, filed April 4, 2000 (now U.S. Pat. No. 6,460,651, issued October 8, 2002), which is a Continuation In Part application of application Serial No. 09/201,398, filed November 30, 1998 (now U.S. Pat. No. 6,044,925 issued April 4, 2000).

Page 31, line 24 through page 32, line 4:

Figures 36A through 45B illustrate a variety of embodiments of low profile, shallow speaker embodiments of the present invention that are mountable in shallow, small clearance locations. To simplify the understanding of each of these embodiments, elements in the various figures that are the same have been given the same reference number. Those elements that are modified and which perform the same or similar function have the same number with the first use without a prime and **for** each variation one or more primes have been added to the reference number.

Page 32, line 19 through page 33, line 20:

Additionally, there is a stiff, substantially flat diaphragm 404 with the diameter of the flat area being larger than the outer diameter of magnet 406. The outer most edge of diaphragm 404 is shown having a "V" shaped outer edge that extends downward and away at approximately 60°, however that specific angle is not critical to the design. Diaphragm 404 is ideally made of a material such as honeycomb, thin aluminum, or other composite and non-composite light-weight materials; conventional cone materials will not work in this application since the diaphragm is substantially flat and light-

weight. Diaphragm 404 is suspended with two matched surrounds: an upwardly extending flexible surround 418 having an inner edge attached to the top of the outwardly extending leg of the "V" shaped edge of the diaphragm and an outer edge attached to the top, outer most flange of basket 402; and a downwardly extending flexible surround 420 having an inner edge attached to the bottom of the inner leg of the "V" shaped edge of the diaphragm and an outer edge attached to a point within basket 402 below the top, outer most flange. With surrounds 418 and 420 mounted in this way, maximum linearity of the inward/outward strokes of the speaker is achieved. Between the attachment points of surrounds 418 and 420, ventilation holes 426 have been formed around the circumference of basket 420. Attached to the lower center of diaphragm 404 is voice coil 412 that fits loosely around the upwardly extending portion of steel doughnut 410 with the upper most turn of the coil of voice coil 412 being spaced ~~**0.5a**~~ **0.5α** below the inner surface of the diaphragm and the coil winding having a height of ~~**2a**~~ **2α** in this overhung configuration. By making the height of the coil winding the same as the thickness of the magnet makes it possible to minimize the overall height of the speaker in every excited and unexcited positions of the diaphragm. With respect to each of the views of Figures 36A, 36B and 36C, and each of the embodiments discussed below, the thickness of **the** diaphragm ~~**will have**~~ **adds** the same amount to the overall height of the speaker in each illustrated state, and since the thickness of the diaphragm can vary depending on the material used, for comparison purposes, the thickness of the diaphragm is not included in the height calculations.

Page 33, line 22 through page 34, line 4:

Figure 36A illustrates the position of the various components of this speaker embodiment when no current is flowing through voice coil 412 and when the speaker is not being driven. In this position, surrounds 418, 420 are relaxed with the lower half of the coil winding **[[is]]** opposite the upper half of the magnet and the inner surface of diaphragm 404 spaced apart from the upper surface of ring 408 by a distance of **[[a]]** **α**. Thus the overall height of the speaker is the spacing between diaphragm 404 and

ring 408, ~~[[a]]~~ α, plus the thickness of ring 408, T, plus the height of magnet 406, ~~[[2a]]~~ 2α, plus the thickness of the flange of 410, T, plus the thickness of the bottom of basket 402, H, for a total of ~~3a + 2T + H~~ 3α + 2T + H.

Page 34, lines 6-14:

In Figure 36B the speaker is in the maximum outwardly extending position with the surrounds both stretched upward and the bottom coil of the voice coil even with the upper surface of ring 408. In this position the speaker achieves the maximum height possible. Here the spacing between ring 408 and diaphragm 404 is ~~[[2.5a]]~~ 2.5α (the height of the coil, ~~[[2a]]~~ 2α, plus the spacing of the upper most turn of the coil ~~0.5a~~ 0.5α from the bottom surface of the diaphragm). Thus the overall height of the speaker in this state is that ~~[[2.5a]]~~ 2.5α, plus the thickness of ring 408 and the flange 410, each T for a total of 2T, plus the height of the magnet ~~[[2a]]~~ 2α, plus the thickness of the bottom of the basket, H, for a total of ~~4.5a + 2T + H~~ 4.5α + 2T + H.

Page 37, lines 5-22

Figures 37 show a fourth embodiment of an overhung, low profile speaker of the present invention. This embodiment, as will be seen, has built in stops that define the maximum inward and outward travel of the diaphragm. Included in this embodiment is a speaker basket 402' with an outwardly extending upper flange that mounts to baffle board 400 of the mounting location of the speaker. Basket 402' has a bottom thickness "H". Mounted centrally within basket 402' is a post 428 having a threaded upper end 430 with the overall height of post 428 being less than the height of basket 402' from the bottom to the mounting flange. Also included is steel ring 408 magnetically adhering to the bottom of circular magnet 406 which in turn magnetically adheres to the flange of circular steel doughnut 410' with a hole therethrough that is tapped at the upper end. The flange of doughnut 410' and ring 408 each have a thickness "T", and magnet 406 has a thickness ~~[[2a']]~~ 2α' (note the distance ~~[[a']]~~ α' in this figure is not necessarily the same as the distance α in Figures 36). Doughnut 410' is screwed

onto the top of post 428 with the ring/magnet/doughnut 408, 406, 410' assembly having a substantially uniform diameter that is suspended above the bottom of the basket. Note that doughnut and flange 410' is substantially the same as doughnut 410 in Figures 36 with the addition of the tapped center hole and being mounted inverted to that of Figures 36.

Page 37, line 24 through page 38, line 12

In this embodiment, diaphragm 404' consists of two elements - a flat ridged top disk 413 and a circular enclosure 409 to the top of which top disk 413 is coupled. Circular enclosure 409 has cylindrical open interior with an inner diameter that is greater than the diameter of assembly 410, 406, 408' that opens to the opening in the basket. Through the center of bottom portion 411 of enclosure 409 is a circular hole that has a diameter substantially equal to that of voice coil 412 with the lower end thereof coupled within the bottom hole of enclosure 409. Voice coil 412 extends upward and fits loosely around the downwardly extending portion of steel doughnut 410' with the lower most turn of the coil of voice coil 412 being spaced **[[~~0.5a'~~]]** **0.5α'** above the inner surface of bottom portion 411 and the coil winding has a height of **[[~~2a'~~]]** **2α'** in this overhung configuration. Additionally, the inner depth of enclosure 409 is **[[~~2a'~~]]** **2α'** Extending radially outward from enclosure 409 is a ring with the outer edge undercut inward shown here at approximately 45°, however the undercut angle is not critical to the operation of the speaker. The outwardly extending ring of the enclosure is coupled to the mouth of the basket by surrounds 418, 420 similar to that shown in Figure 36A.

Page 38, lines 14-24

Figure 37A illustrates the position of the various components of this speaker embodiment when no current is flowing through voice coil 412 and when the speaker is not being driven. In this position, surrounds 418, 420 are relaxed with the upper half of the **voice** coil winding **[[~~is~~]]** opposite the lower half of the magnet, and the inner

surface of plate 413 of diaphragm 404' is spaced apart from the upper surface of the flange of 410' by a distance **[[~~a'~~]]** α'. Thus the overall height of the speaker is the distance between diaphragm 404' and the upper surface of 410', **[[~~a'~~]]** α', plus the thickness of 410', T, plus the height of magnet 406, **[[~~2a'~~]]** 2α', plus the thickness of ring 408, T, plus the spacing between ring 408 and the inner surface of 411, **[[~~a'~~]]** α', plus the thickness of 411, J, plus the distance between 411 and the bottom of the basket, α', plus the thickness of the bottom of basket 402', H, for a total of ~~**5a' + 2T + J + H**~~ **5α' + 2T + J + H**.

Page 38, line 26 through page 39, line 11

In Figure 37B the speaker is in the maximum outwardly extending position with the surrounds both stretched upward, voice coil 412 is fully within the inner diameter of magnet 406, and the bottom 411 of enclosure 409 is in contact with the lower surface of ring 408 being pulled into that position by the fact that voice coil 412 is connected to 411. Note that a circular groove 416 has been provided in the flange to protect the top edge of the voice coil bobbin from bottoming out with the flange. This contact between 411 and the bottom of 408 stops of the upward travel of diaphragm 404'. In this position the speaker achieves the maximum height possible. In this configuration the height of the speaker is the spacing between plate 413 of diaphragm 404' and 410', **[[~~2a'~~]]** 2α', plus the thicknesses of 410' and ring 408, each T, plus the height of magnet 406, **[[~~2a'~~]]** 2α', plus the thickness of 411, J, plus the distance between 411 and the bottom of the basket, **[[~~2a'~~]]** 2α', plus the thickness of the bottom of basket 402', H, for a total of ~~**6a' + 2T + J + H**~~ **6α' + 2T + J + H**.

Page 39, lines 13-20

In Figure 37C the speaker is in the maximum inwardly extending position with the surrounds both stretched inward and the overall height of the coil of voice coil 412 totally withdrawn from within the inner diameter of magnet 406 with the inward pull of the speaker being limited by the bottom surface of 411 coming into contact with the

bottom of basket 402'. In this position the speaker achieves the minimum height possible. That height is the thicknesses of 410' and 408, each T, plus the height of the magnet, [[~~2a'~~]] 2α', plus the thickness of 411, J, plus the thickness of the bottom of basket 402', H, for a total of ~~4a' 2T + J + H~~ 4α' + 2T + J + H.

Page 39, line 22 through page 41, line 7

Figures 38 show a fifth embodiment of an overhung, low profile speaker of the present invention that is similar to the fourth embodiment of Figures 37 with the only difference being the configuration of the diaphragm which gives the speaker the same height regardless of the position of the diaphragm for all levels of excitation. This embodiment, as will be seen, also has built in stops that define the maximum inward and outward travel of the diaphragm. Given that only the diaphragm is different from the embodiment of Figures 37, only the configuration of the diaphragm will be discussed here. Diaphragm 404" is similar to diaphragm 404' of Figures 37, the difference being that diaphragm 404" does not have top plate 413 and the depth of enclosure 411' is only [[~~2a'~~]] 2α' as compared to the [[~~4a'~~]] 4α' depth of enclosure 411 of diaphragm 404' of Figures 37. Thus, each of Figures 38A, B and C are similar to Figures 37A, B and C with all of the components in the same positions without plate 404' above 410'.

Page 40, lines 9-13

Thus the unexcited height of the speaker in Figure 38A is the thicknesses of each of 410' and 408, each being T, plus the height magnet 406, [[~~2a'~~]] 2α', plus the spacing between ring 408 and the inner surface of 411', [[~~a'~~]] α', plus the thickness of 411', J, plus the distance between 411' and the bottom of the basket, [[~~a'~~]] α', plus the thickness of the bottom of basket 402', H, for a total of ~~4a' + 2T + J + H~~ 4α' + 2T + J + H.

Page 40, lines 15-19

The maximum outward excited height of the speaker in Figure 38B is the thicknesses of each of 410' and 408, each being T, plus the height magnet 406, **[[~~2a'~~]]** **2α'**, plus the thickness of 411', J, plus the distance between 411' and the bottom of the basket, **[[~~2a'~~]]** **2α'**, plus the thickness of the bottom of basket 402', H, for a total of ~~**4a' + 2T + J + H**~~ **4α' + 2T + J + H**.

Page 40, lines21-25

Similarly, the maximum inwardly excited height of the speaker in Figure 38C is the thicknesses of each of 410' and 408, each being T, plus the height magnet 406, **[[~~2a'~~]]** **2α'**, plus the spacing between ring 408 and the inner surface of 411' which is the same as the winding height of voice coil 412, **[[~~2a'~~]]** **2α'**, plus the thickness of 411', J, plus the thickness of the bottom of basket 402', H, for a total of ~~**4a' + 2T + J + H**~~ **4α' + 2T + J + H**.

Page 41, line 24 through page 42, line 11

Figures 42 illustrate a first underhung, low profile speaker embodiment of the present invention. This embodiment is similar to the overhung embodiment of Figures 36 with only three changes. One change is the replacement of magnet 406 that has a height of **[[~~2a'~~]]** **2α'** (Figures 36) with magnet 406' with a height of "M" (Figures 42) in the same location of the structure. A second change is the replacement of steel ring 408 that has a thickness of "T" (Figures 36) with a steel ring 408' with a thickness of **[[~~2a'~~]]** **2α'** (Figures 42). The third change is the replacement of voice coil 412 with a coil winding that is **[[~~2a'~~]]** **2α'** high and spaced 0.5α below the underside of diaphragm 404 (Figures 36) with a voice coil 412' with a coil winding that is **[[~~0.5a'~~]]** **0.5α'** high and spaced 2α below the underside of diaphragm 404 (Figures 42). With these changes the underhung, low profile speaker of Figures 42A, B and C performs in the same way as the overhung, low profile speaker of Figures 36A, B and C with the same overall heights of the speaker in each of the illustrated excitation/non-excited positions illustrated in Figures 36A, B and C and Figures 42A, B and C, respectively.

Page 42, lines 13-17

Namely, in Figure 42A the overall height is the spacing height between the under side of diaphragm 404 and the top side of ring 408', **[[a]]** **α**, plus the thickness of ring 408', 2α, plus the height of magnet 406', "M" (that is equal to "T"), plus the thickness of the flange on 414, "T", plus the thickness of the bottom of basket 402, "H", for an overall height of ~~**3a + T + M + H**~~ **3α + T + M + H** which is equal to ~~**3a + 2T + H**~~ **3α + 2T + H** in Figure 36A.

Page 42, lines 19-24

In Figure 42B the overall height is the spacing of the winding of voice coil 412' from the underside of the diaphragm, **[[~~2a~~]]** **2α**, plus the height of the coil winding, **[[~~0.5a~~]]** **0.5α** plus the thickness of ring 408', 2α, plus the height of magnet 406', "M" (that is equal to "T"), plus the thickness of the flange on 414, "T", plus the thickness of the bottom of basket 402, "H", for an overall height of ~~**4.5a + T + M + H**~~ **4.5α + T + M + H** which is equal to ~~**4.5a + 2T + H**~~ **4.5α + 2T + H** in Figure 36B.

Page 43, lines 6-25

A second embodiment of an underhung, low profile speaker of the present invention is illustrated in Figures 43. This embodiment is also similar to the first overhung embodiment of Figures 36 with two changes to the speaker structure. One change is the replacement of voice coil 412 with a coil winding that is **[[~~2a~~]]** **2α** high and spaced **[[~~0.5a~~]]** **0.5α** below the underside of diaphragm 404 (Figures 36) with a voice coil 412' with a coil winding that is **[[~~0.5a~~]]** **0.5α** high and spaced **[[~~2a~~]]** **2α** below the underside of diaphragm 404 (Figures 43). The other change is the replacement of steel ring 408 (Figures 36) with a second steel doughnut 408" with a flange inverted over magnet 406. The doughnut portion of 408" having an outer diameter that is substantially the same as the inner diameter of magnet 406, and an outer diameter that is substantially less than the outer diameter of the doughnut portion of 410 thus leaving a space between the two doughnuts that is significantly

wider than the thickness of the mounting ring of voice coil 412'. The doughnut portion of 408" extends down the inside surface of the magnet, nearly the entire height of the magnet leaving a space between the bottom end of 408" and the upper surface of the flange of 410. The flange portion of 408" having a thickness, "T", that is the same as the thickness of ring 408 in Figures 36. The doughnut portion of 408" being needed to extend the effect of the upper pole of magnet 406 (typically considered to be the North pole) into the space traversed by the winding of voice coil 412' to permit operation of the speaker in an underhung configuration.

Page 47, line 23 through page 48, line 12

Referring next to Figure 47 there is shown, in cross-section, or a center slice of, a convention speaker with the spider connected to the top edge of the voice coil bobbin and without cross-hatching to minimize confusion. This speaker includes a basket 600 with the excitation motor mounted in the bottom of basket 600. The motor includes a steel center pole piece 610 centered in the bottom of basket 600 and extending upward away from the bottom of the basket into the interior thereof. Next there is shown a pair of circular magnets 608 resting on an outward extending flange of pole piece 610 and surrounding the upward extending portion of pole piece 610. Then, on the top surface of the top magnet 608 is a circular steel top plate 606 having a circular center hole that has a diameter that is somewhat larger ~~that~~ **than** the outer diameter of pole piece 610 to allow room for the lower portion of voice coil bobbin 602 and the voice coil 604 wound thereon to pass within a narrow space between the outer surface of pole piece 610 and the inner hole through top plate 606. Thus the inner diameter of bobbin 604 is slightly larger than the outer diameter of pole piece 610 and the outer diameter of the combination of bobbin 602 and voice coil 604 wound thereon is smaller that the diameter of the center hole in top plate 606.

Page 51, lines 10-19

To complete the assembly of the speaker, lateral support diaphragm 622 is then

put in place. As can be seen in Figs. 48A and 48B, on the under side of diaphragm 622 two centering features are formed thereon. One is a centering ring 624 that is perpendicular to the under side of lateral support diaphragm 622 with the center of the circle formed by centering ring 624 being the center of lateral support diaphragm 622, and the inside diameter of centering ring 624 is substantially the same as the outer diameter of extension ring 628. Slightly spaced apart from, and inside centering ring 624 is a circular positioning bead 636. Circular positioning bead 636 could be formed as a ~~**continuos**~~ **continuous** ring of material or spaced apart raised dots in a circle inside centering ring 624.

Page 52, lines 12-18

Lateral support diaphragm 622 functions similarly to the "cone" of a conventional speaker; diaphragm 622 is the sound radiator in the speaker of the present invention ~~**and**~~ **wherein** the cone is the sound radiator of the conventional speaker. In the present invention the lateral support diaphragm 622 is stiff, substantially flat and light-weight. Additionally, cone 616 can be made of conventional materials since the only purpose of cone 616 is one of the structural elements that minimize or eliminate wobble of bobbin 602.

Page 52, lines 20-26

The ends of the wire of voice coil 604 are typically glued to, and dressed up the ~~**out side**~~ **outside** of bobbin 602 toward the upper end portion thereof. Those wires could be then dressed up the underside of cone 616 for attachment to other wires that are attached to input terminals (not shown). Alternatively, the ends of the voice coil wires that have been dressed up the outside of bobbin 602 could be connected to wires that have been placed through spider 612 with the other end of those wires close to basket 600 then attached to input terminals (not shown) mounted on the basket.

Page 56, lines 9-23

In each of Figs. 49A and 49B **[[is]]** **it** can be seen that when cone 616 is not in the at rest position of Fig. 47 there is a harmonic bending wave that travels through the skin of cone 616. As can be seen in Figs. 49A and 49B, the forces on cone 616 have a bending waveform illustrated by the variation in magnitude of the force vectors along the surface of cone 616 with the direction of the force vectors changing direction at some point on the surface of cone 616. At the point where the force vectors change direction, cone 616 is bent in different directions that can be likened to bending of a thick piece of wire. These force variations during operation of the speaker cause plastic deformation of cone 616 with the material of cone 616 having a cycles per life failure rate. The non linear stiffness in the cone, along with the offset in the spider and in the outer surround will produces a wobble that is harmonically related to the signal. This distortion is audible and is typically ignored in current speaker design. If these differences in these parts are large enough and do not cancel each other, their force will cause voice coil bobbin 602, and perhaps also voice coil 604 to rub ~~**some where**~~ **somewhere** within the magnet assembly and eventually lead to speaker failure.